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An Exploration of Religiously Based Opposition to Clinical and Scientific Interference with the Embryo

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<http://dx.doi.org/10.5772/intechopen.74549>

Abstract

The advent of *in vitro* fertilization (IVF) into clinical practice highlighted to ethicists and theologians, ways in which scientists and clinicians are interfering with the development of human embryos in the laboratory. This is because an increasing amount of research is being directed onto embryos, frequently involving their destruction. These procedures range from IVF and pre-implantation genetic diagnosis (PGD) to gene editing. Some religious groups are implacably opposed to all such developments on the ground that the human embryo is to be protected from the 'moment of conception'. Widespread opposition to abortion and fetal destruction has been translated into opposition to the destruction of embryos. By viewing embryos as having a value commensurate with that of postnatal moral persons, opposition to all recent biomedical developments becomes inevitable. The rationale for this stance in the writings of certain Roman Catholic and Protestant scholars is outlined, as are implications for theology's relationship with science, the church community and the public square. Does this mean that these groups are unable to contribute to ethical debate in each of these areas? The reasoning behind embryo protection stances will be critiqued, and the importance of finding common ground by examining core values and accepting the centrality of dialog will be stressed.

Keywords: embryo, moral status of embryo, IVF, religious opposition to embryo research, theological perspectives, public square

1. Introduction

The year 1978 marked a watershed year in reproductive technology, since it was in that year that the first baby was born artificially—in the sense that the fertilization had been brought about in the laboratory and hence outside a woman's body [1–3]. However, as so often happens, the event that caught the attention of the world was merely the end result of a series

of revolutionary steps that had taken place over a number of years previously in achieving fertilization *in vitro* in the laboratory in various experimental animals [4–6] and then in humans [7]. The development of *in vitro* fertilization (IVF) is the story of the experimental manipulation of the human embryo [8], since apart from this there can be no IVF or any of its associated procedures, spanning intracytoplasmic sperm injection (ICSI) to preimplantation genetic diagnosis (PGD), and from the derivation and use of embryonic stem cells (ESCs) to gene editing.

Regardless of the scientific, clinical and social consequences of these developments, there can be no escape from the underlying fact that none of these would have been possible were it not for the ability of scientists to experiment on the human embryo [9, 10]. Consequently, for the first time, the living and maturing embryo was exposed to human gaze. For the embryologist, this meant that its characteristics and development could be analyzed and potentially modified. With the increasing availability and power of genetic analysis, the potential offered by analyzing embryos has increased exponentially, especially by various forms of gene editing [11–13].

In their different ways, each of these procedures has posed profound challenges to ethicists and theologians who have placed considerable, and in some cases absolute, value on embryos. If embryos are viewed in this light, as entities to be protected at all costs, opposition to any form of embryo manipulation is inevitable.

In following the consequences of a stance such as this one, attention will be confined to the theological foundations employed by those Christian communities that adopt protectionist positions on the embryo. While their views are not representative of those of all Christian churches or organizations, and while they do not of necessity represent all other religious persuasions [14], their opposition to research on embryos constitutes a valuable case study in religious opposition to scientific investigations. From what does this opposition stem? Should it be taken seriously or ignored? And if taken seriously how might it be countered?

2. Understanding the context of religious opposition to embryo research

In the early 1970s as I followed the developments taking place in efforts to achieve *in vitro* fertilization in mammals and then humans, I was optimistic that the stalemate experienced over abortion could be avoided [15]. The diametrically opposing views on abortion had led to an either-or situation, characterized unhelpfully in my estimation by simplistic pro-life and pro-choice positions. All the nuances of the debate were ignored as this two-position oppositional stance emerged as the predominant model driving the debate to its inevitable end of bioethical stalemate and political stagnation. My hope was that this could be avoided when attention turned to the embryo, with its emphasis on much earlier development than that represented by the fetus. Sadly, this was to be a forlorn hope, as the vehemence of the abortion debate was transferred to the embryo debate [16–18]. Any scientific distinctions between the embryo (ranging from fertilization to 8 weeks' gestation) and the fetus (from 9 weeks' gestation to term) disappeared as the whole weight of ethical interest shifted to fertilization itself [19] or conception as it is frequently referred to in theological circles [20].

The result has been that the embryo has become the center of theological attention, and in some circles the litmus test of theological orthodoxy [21, 22]. And yet there are major differences between the two, differences that are downplayed or even ignored in theological ethical debate. Abortion is characterized by the conflict that centres on the women who request abortions and the clinicians who undertake them. In the case of the manipulation of embryos and the inevitable destruction of many of them in IVF, the conflict centres on the fertility specialists responsible for the IVF procedures, and scientists whose work has made IVF possible. The clinicians in abortion clinics are responsible for bringing a (fetal) life to an end at the behest of the pregnant women, regardless of the rationale for this. The clinicians in fertility clinics have the role of bringing new life into existence, although this is accompanied by the loss of other embryos that are found to be unsuitable for implantation into the mother, or are surplus to the requirements of the mother/couple. Hence, there is not a simple parallel between the two scenarios, quite apart from the differing stages of development of the nascent human life.

The result of this conflation of the two procedures is that the distinction between fetal destruction and embryo destruction has been obliterated, meaning that the stage of development of embryonic/fetal life has become irrelevant for ethical and theological debate. This in turn has had two consequences. It has led to a downgrading of the significance of scientific input into ethical and theological analyses of prenatal existence. Scientific input is not required, having been replaced by theological input that is not dependent upon scientific contributions. The second consequence is that the controversies over abortion have been seamlessly transferred to debate over the reproductive technologies. Destruction of the fetus and destruction of the embryo are regarded as morally and theologically equivalent [23].

Against this background it is unsurprising that opposition to abortion leads to opposition to the use of ESCs, since both are regarded as on a par ethically and theologically. This is because both are seen as leading to the destruction of human life, which in the eyes of certain theological commentators has equal moral value to postnatal life [24, 25]. In these terms, destruction of a 3-day-old embryo is viewed as ethically and theologically equivalent to the killing of a 3-year-old child or a 30-year-old adult. In light of this paradigm, research on human embryos is considered to be unethical and theologically untenable, and any opposition to abortion leads inevitably to opposition to embryo research and embryo destruction.

What stands out as one views these developments has been a major paradigm shift in approaches to the embryo. A largely metaphysical question, centering on the moral status of the embryo, has become an intensely practical question as to the manner in which embryos are treated *in vitro*. This is because until the 1960s–1970s embryos were inaccessible to scientific investigation, being located within women's bodies and hence largely unknown to all but embryologists and reproductive biologists. They could not be, and were not, a subject of interest to theologians, whose interest lay in abortion and the loss of fetuses from around 8–12 weeks' gestation onwards. The advent of *in vitro* fertilization in the late 1970s and into the 1980s heralded, not only a scientific and clinical revolution, but also a challenge of immense proportions to theological thinking with its lack of signposts on how best to view these once hidden entities. This was a new world for which they were ill-prepared, since the notion of the

high moral status of the embryo, and its consequent inviolability, led to total rejection of any interference with human embryos [26]. This immediately put many theologians, as well as large swathes of the Christian community, at odds with the scientific community and unable to contribute productively to bioethical debate.

I shall argue that this dissonance is unnecessary and should be dispelled by re-examining a religious approach to the embryo, and providing a means for those with religious perspectives to engage productively with biomedical scientists.

3. The emergence of IVF

The first clear evidence that it was possible for fertilization to be achieved outside the body was provided in 1969 [7], with the first birth of a baby in 1978. The scientific work behind this momentous outcome was accompanied by considerable controversy within scientific circles [2], based largely on its questionable safety, the relatively low importance given to the treatment of infertility, and the perceived experimental nature of the procedure [27]. Ethical issues were integral to all that was being accomplished, and some of these had religious overtones, such as the triumph of human design over natural processes, threats to the dignity of procreation resulting from use of a technical procedure, the possible abnormality of resulting children, and its failure to 'cure' infertility [28, 29].

In the laboratory and clinic daily ethical issues were encountered, since the success rates of IVF were low, and as many as 5 or 6 embryos per cycle were inserted by some clinicians in a desperate attempt to improve success rates [3]. This led to the destruction of large numbers of embryos, and serious questioning about the ethical acceptability of what was being done. Moreover, fundamental research questions had to be addressed regarding the criteria for defining embryos, the legitimacy of donating sperm, eggs and embryos, the freezing of embryos, and what one did with embryos with extra chromosomes and other abnormalities. All these issues pointed to the need for ongoing research on embryos [2, 3].

The driving force behind this work was provided by the perceived plight of the infertile, and not the welfare of embryos [30]. The major contributor was Robert Edwards, who forged ahead with it even though many around him viewed it as 'impossible scientifically and untenable ethically'. For Edwards, there was only one goal: 'the most important thing in life is having a child' [29]. Edwards was a fascinating hybrid, a basic scientist who longed to know more about human fertilization, an applied scientist who was driven to help those with infertility issues, and a human being who longed for meaningful ethical debate [30]. This latter commitment drove him to engage with politicians, philosophers, and theologians, on the ground that he wanted society to take informed decisions [31]. In the early 1970s, he could see that IVF would 1 day extend well beyond its immediate clinical dimensions to the production of chimaeras, nuclear transfer and clones [32], while more realistically in 1989 he discussed topics ranging from embryo donation and embryo freezing, to the prenatal diagnosis of genetic defects, sex selection, and stem cells [3]. In 1999 Edwards stirred controversy by stating that parents should never be allowed to bring into the world children afflicted by genetic

diseases, and even more pointedly in 2003 claimed that it was scientists who were in charge rather than God.

Aside from provocative pronouncements of this nature, Edwards wrote perceptively about the ethical implications of his work. Looking back in 2007 he wrote that he and his team had been determined to achieve the first IVF birth and would continue unless something seriously wrong appeared [29]. It was this goal that drove him relentlessly on, in spite of many claims by others that what he was doing was immoral, illicit, dishonest and illegal. Throughout, he wrote provocatively and forcefully about the ethical implications of his work, repeatedly aiming to integrate his scientific expertise with an understanding of the ethical dimensions of his work [30].

It is noticeable that up to this point there has been practically no reference to any theological input into what he was doing, beyond contributing to the negative consensus emanating from diverse perspectives. This was seen as erudite research with no practical relevance, at least until 1978, when the birth of the first IVF individual transformed everything. IVF now entered the medical mainstream, and within a remarkably short space of time it had become an established and generally accepted procedure for bypassing infertility. While this recognition meant that it was now supported and acknowledged by scientists and clinicians, religious authorities were awoken from their stupor and began to realize that reproduction could be changed forever, with major repercussions for the moral standing of embryos. However, these reactions did not surface until 1984 with the production in the UK of the Warnock Committee of Inquiry Report [33].

According to this Report, IVF should be considered an established form of treatment. Egg and sperm donation along with embryo donation were accepted, as were the freezing of semen and embryos. Of particular interest for the current debate was the special, but limited, status given to the embryo, with some protection in law. This allowed research on embryos up to 14 days after fertilization. At that time, research was to be limited to those 'surplus' to the requirements of IVF programs, although in the UK this has controversially been widened to include those specifically created for research purposes.

While much has changed in succeeding years, the Inquiry set the benchmark for IVF and research on embryos, and in essence vindicated the work of Edwards and colleagues over the years leading to the establishment of IVF as a viable clinical procedure. It was also this Report that awakened the religious establishment and opened the floodgates for one UK Christian writer after another to strenuously object to the Report and in particular to its view of the human embryo.

4. Theological responses

The official Roman Catholic position on IVF stems from *Donum Vitae* in 1987, with its basic dictum that unconditional respect is to be given developing human life from 'the moment of conception' [34]. On this basis the early embryo (zygote) is inviolable and is not to be destroyed. Hence, the voluntary destruction of *in vitro* human embryos for research purposes is condemned.

By choosing those embryos that are to be allowed to live and those that are to be killed, researchers are usurping the place of God (**Table 1**). The freezing of embryos is equally problematic, since this process subjects them to human decision-making and leads to technological domination over ‘the origin and destiny of the human person.’ This opens the door to what is

Characteristics of embryos from fertilization	Practical consequences
Fully human	Protectionist/precautionary stance
Sacrosanct	Opposition to:
Absolute right to life	IVF/PGD
Creations of God	Embryo research
Called by God	Freezing of embryos
Images of God	Selection of embryos
Personally loved by God	Spare/surplus embryos
	Biology irrelevant
	Needs of infertile ignored
	Opposition to genetic analyses
	Embryo viability irrelevant
	Embryos are untouchable
Additional science-based concerns	Result
Increasing power of science	Antagonism towards science
Possible harm to subsequent children	Rejection of reproductive technologies
Threat to role of God in reproduction	Reject ‘common morality’ approach
Impact of the artificial on human life	
Children are ‘made’	
Excessive human dominion	
‘Playing God’	
Usurps place of God	
Slippery slope	
Positive religious perspectives	Outworking in practice
Humans participate in work of God	Support in principle for medical research
Gradualist view of embryonic development	Care of family and child
Importance of relief of suffering	Benefits to outweigh harms
Support efforts towards healing	Take note of needs of infertile
Cautionary perspective	Cautious approval of ARTs
Pro-research as a principle	Pastoral support for childless
	Actively participate in public sphere
	Openness to dialog

Table 1. Major reasons for religious opposition to the reproductive technologies.

described as 'radical eugenics'. Consequently, IVF and indeed all the ARTs are branded unworthy means of bringing human life into existence, so that a child obtained in this way has to be seen as a product to be judged by its quality rather than by who he or she is [35].

In 2008 the Congregation's document, *Dignitas Personae*, sought once again to defend the dignity of the human embryo from conception onwards. More specifically, it objected to ICSI, the freezing of embryos and oocytes, PGD, and embryo donation. It claimed that embryos are fully human from fertilization, and are to be treated as sacrosanct. In these terms, there is no room for any technological interference into, or human control over, them or the reproductive process. An inevitable outcome of this stance is that the Vatican is unable to contribute in a positive way to ongoing discussions about any facet of how the reproductive technologies are to be adapted or used, let alone about the nature or direction of research on embryos [36].

Underlying these views is the premise that the sole object of moral reflection is to be directed onto the embryo, with little attention given to infertility issues and their repercussions for the health of a marriage and the partners in the marriage, nor for the welfare of the prospective child. For some Roman Catholic writers these are crucial considerations that open the door to the possibility of employing the artificial reproductive technologies (ARTs) [37]. Others opt for an alternative approach based on prudence that takes account of an ethic of feminist care [38], while yet others condemn what they regard as an outdated physicalist version of natural law and excessive fears about a eugenic mentality [39]. Each of these alternative Roman Catholic visions wishes to take seriously the scientific data and discover how they may best be utilized to contribute positively to the human condition.

Other Roman Catholic contributions that deviate from the official Vatican position challenge the view that full moral value commences at 'conception', placing the embryo's acquisition of individuality of personhood at some later point, whether 4–6 days [40] or 2–3 weeks after fertilization [41]. Neither the precise dates nor the reasoning behind them are of concern here, except to state that they all take into account other parties in the reproductive process. These revolve around two questions: whether human beings can ever act as God's instruments to interfere with new life from continuing on its developmental pathway, and whether they can alter that trajectory; and whether the integrity of human relationships in marriage and family life should have any bearing on the ethical and theological stance adopted. Despite the assurance of the official Vatican statements, that would answer these queries unequivocally in the negative, there are dissenting voices.

Protestant voices can largely be dated back to the latter part of the 1980s, although there are examples of input in the 1970s. Paul Ramsey spearheaded ethical debate from 1970 onwards, although his emphases are instructive when viewed from many years into the future. His central concern was that there was no way of knowing whether experiments on the unborn would harm the fetuses and subsequent children [42–44]. This concern far outweighed the plight of infertile couples desiring a child [45]. More speculatively, Ramsey was worried that the use of IVF would ultimately lead to the widespread adoption of artificial means of producing children. Threaded throughout his thinking was a fundamental concern that the increasing power of scientific manipulation was becoming a threat to the role of God in upholding and sustaining human beings through illness and infirmity [46] (Table 1).

Ramsey's concerns are fascinating from today's perspective, when the welfare of the embryo has such a prominent part to play in religious discussions on the ARTs. He paid little attention to the embryo. Was this because he was writing in the early 1970s before IVF had been shown to be capable of producing a living healthy child? And yet, Edwards was publishing prolifically in the 1970s and was calling out for theological and ethical debate. Ramsey was writing in the US whereas Edwards was in the UK, and Ramsey may have been unaware of the scientific debate. Nevertheless, his writings on it were well informed. One can but speculate, and assert that Ramsey's theological interests placed greater emphasis on fetuses and resulting children than on embryos.

In an analysis of religious responses to IVF from the 1980s onwards, Jones [46] has categorized them as essentially negative or positive. Simplistic as this distinction appears it represents the distinction between suspicion of IVF due to stress laid on the wellbeing of the embryo, as opposed to openness to IVF with stress placed on the needs of the infertile. Further categorization by Jones [46] recognized five categories: A–E. Of these, A–C are embryo centered: categorical (A), precautionary (B) or human dominion (C) driven. D is child and family centered, placing stress on infertility, while E is desire centered, driven by technological imperialism. In their differing ways, A–C all look to protect embryos.

Of the three, A is the most idealistic, since its categorical assertion that 'human life commences at conception' leads to total protection of all embryos on the ground that they have a value equivalent to that due to all other human beings [47, 48]. If all embryos are to be protected there can be no situation in which they are sacrificed for any end other than their own thriving [49]. Some writers are far more emotive than this referring to the killing of innocent human life [50]. However, one does not have to be emotive to follow the rationale of such a position—the total rejection of any of the ARTs, along the lines of the Vatican stance. It also follows that any procedure involving the production of an excess number of embryos, let alone the manipulation of embryos, are deviations from God's creation pattern [51, 52]. IVF becomes morally and theologically indefensible and children produced in this way fall far short of being seen as gifts of God [12, 53].

Category B is driven by the same basic presuppositions, but is less categorical, looking instead to a precautionary approach. It ends up at the same point, but seems to concede that there is some uncertainty around the proposition that all embryos deserve total protection at all times. The onus is placed on those who do not accept this position to demonstrate that all human embryos are not persons [54]. Their interest appears to be in presuming that all embryonic life is innocent and inviolable, rather than in addressing the immediate question of whether IVF and its allied procedures are tenable. The presumption is that they are not, but one is left wondering what the precautionary principle would say about the benefits held out by IVF for many in the population.

Category C, with its stress on the role of human dominion is not primarily concerned with the embryo and yet has implications for the way in which embryos are treated. The emphasis in this instance is on the perceived dangers emanating from technological inroads into reproduction resulting in children being 'made' technologically rather than begotten naturally [24]. Use of the word 'begotten' points to the religious underpinnings of this stance, and the practical

outworking of the position is to reject the ARTs, all of which are viewed as acts of manufacture. The concern here is that these technologies are being used to dominate other human beings like us. Hence, its outworking is to question the involvement of medical science in research on the embryo, on account of its being a threat to humans standing before God.

Category D, with its focus on the wellbeing of the family and the negative consequences of infertility, encompasses within its ambit a large number of religious spokespeople [30, 55, 56]. For writers such as these, emphasis is placed on the nature of human life in the image of God and a duty to respect it, the importance of marriage and the family, and the centrality of pastoral support for those suffering from childlessness and infertility. The standing of the embryo is viewed alongside these broader principles and does not predominate in ethical decision-making. Consequently, whatever moral values are attached to it do not emerge as of greater importance than the context within which it is being considered and the other participants within this. The result in practice is that the embryo is viewed as of considerable moral significance, but in practice that will be less than absolute. This allows for a diversity of views on when during gestation the moral value of the embryo increases to such an extent that it should not be used for research or therapeutic ends. Those fitting within the category will be in a position to accept the 14-day upper limit for research suggested initially by the Warnock Report [33].

Category E, with its technological imperialism, points to the many ways in which the simple case of IVF encountered in the 1980s has been extended socially and technologically in the intervening years. The importance of these for the reproductive technologies cannot be denied, as PGD is now used to detect a wide range of conditions, including late onset genetic disorders, and sex selection for social reasons, overcoming mitochondrial disorders using a three parent IVF procedure, next-generation sequencing to check embryos for abnormal chromosomes, and whole genome sequencing to read the DNA of IVF embryos before choosing which to implant. These and numerous other procedures fit within the ambit of contemporary medicine, and are accepted by Christian (and other religious) scholars with a Category D worldview. Where they will diverge from Category E exponents is in their rejection of a posthuman future characterized by highly speculative visions of a technologically enhanced and physically transformed future [11, 57]. It is safe to say that few, if any, religious writers will be found within Category E thinking.

5. Theological case studies

As evidenced by the above categories, there is a diversity of religious stances on the embryo. Nevertheless, the fallback position is invariably a protectionist one, with protection to extend from the earliest point of its existence, namely, fertilization. A clear example of this was provided by a statement provided by an *ad hoc* group of Christian theologians from the Anglican, Catholic, Orthodox and Reformed traditions in the UK, in their response to a House of Lords Select Committee on stem cell research in 2001 [58]. While the theologians involved came from a variety of religious traditions and theological persuasions, they concluded with

five principal considerations to inform any Christian evaluation of the moral status of the embryo. These included: “each human being is called and consecrated by God in the womb from the first moment of his or her existence, before he or she becomes aware of it. Traditionally, Christians have expressed the human need for redemption as extending from the moment of conception.” The wording of this statement is intriguing, since it refers to the ‘traditional’ position, and to the need for redemption from conception onwards. It is far from clear what this means in practice, since it is not self-evident what prenatal redemption amounts to. The statement explains that concern over the fate of embryos destined for research is inspired by the narratives of the Annunciation, the Visitation and the Nativity, plus the parables of the Good Samaritan, and the sheep and the goats. From this it concludes that an ethically serious position “should be to regulate the procedures in fertility treatment and non-destructive medical research on human embryos such that these human individuals are adequately protected.” Intriguingly, the statement is titled ‘A theologian’s brief’, giving the impression that all those engaged in discussion were united in their final conclusions, and possibly that this is the only tenable theological position to hold on the status of the embryo. It also presumes that there are no legitimate alternative theological positions, especially ones based on a gradualist view of embryonic development [36, 59, 60]. It is also noticeable that a theological position can be reached without any reference to scientific input. What is being set forth here is an embryo protection framework, that has been most precisely outlined in Vatican documents [35, 36].

One theological work directly addressing the status of the human embryo is MacKellar’s 2017 book [23], *The Image of God, Personhood and the Embryo*, aimed at casting light on the status of the human embryo from the perspective of the image of God and personhood. While it cannot be taken as representative of all theological positions on the embryo, it comprehensively embodies a swathe of conservative theological thought on the topic. As such it underscores the conclusions reached by many theologians on the status of the human embryo, and that stand in stark contrast to the conclusions reached by embryologists and developmental biologists. It leads to questions such as the relevance of theological inquiry for the thinking and practices of biomedical scientists, including those who are Christians. On the flip side, it raises the question of whether clinical and research studies on human embryos are theologically and morally untenable.

For MacKellar [23] embryos are always completely whole, no matter what their stage of development. Each new embryo is a creation of God and an expression of profound and real love; to be made in the image of God is to be made from the personal love of God. He writes: “God’s love is always behind the creation of a human child and this love always continues towards the child. There is never a moment in all the existence of the child (even at the very beginning of his or her existence) wherein he or she is not loved by God” (p. 86). Consequently, God’s love continues to exist for the embryo at every stage of its development. In other words, “there can be no discontinuity between the love of God who brought this embryo into existence and the same love of God who continues to love this embryonic person” (p. 92). In light of this, there can be no increase in developmental potential or enhancement of status throughout an embryo’s development. The 1-day-old embryo is loved in precisely the same way as the 14-day-old or the 28-day-old embryo; God’s love is absolute at all these stages. It follows,

according to MacKellar, that God's love is equally great for an embryo brought into existence by rape as for an embryo brought about through loving union in a loving family. This is because the social and family context is irrelevant, as is the location of the embryo—in the uterus, in the abdominal cavity, or *in vitro* in the laboratory.

MacKellar [23] also contends that the viability of embryos is irrelevant, since God loves them irrespective of whether they do or do not possess the capability of developing into a child. Inevitably, therefore, biology has become unimportant, since theologically an early embryo has 'a complete, intrinsic and inherent potential' regardless of any biological potential. It is on these theological grounds that "full respect and protection must be given to the human embryo from the moment of conception" (p. 190). This low view of biology is explicitly expressed by MacKellar when he contends that: "biology or any other scientific discipline will never be able to demonstrate, logically, that a rational, autonomous, sensitive being has any moral worth. It can only show that the human being is a pile of biological cells of the species *Homo sapiens*" (p. 193). Even more explicitly, "From a theological perspective The number of cells or their state of differentiation in a person may not actually matter ... it is whether the embryo exists, is complete and is a whole that is important" (p. 201) (Table 1).

In MacKellar's eyes [23] the location of the embryo, whether *in vitro* or *in vivo*, is irrelevant since it has full moral status no matter where found and whether or not it has any potential, biologically and environmentally, to develop any farther. All that matters is the existence of an embryo, even if this has only been for as little as a few seconds (p. 207). The biological irrelevance of his theological position is accentuated by the claim that the absence of neural configurations does not signify that the embryo is incapable of feeling pain and of suffering (p. 215).

Surprisingly, MacKellar [23] admits that the moral status of an embryo will never be completely determined, but he still insists on its complete protection (p. 236). This is unexpected in light of his repeated stress on the theological and ethical significance of the 'moment of conception'. For instance, he claims that: "from the moment of its creation, the human embryo is an organized, living unity. It has the right to be protected as any other human being and not used for the sole benefit of others in their quest" (p. 236). What he is doing is giving the embryo the benefit of doubt, and presuming that it has a moral status equivalent to that of adults (p. 231). Even more emphatically, it is asserted that destroying them is equivalent to waging war against God personally (p. 237; see also [61]), a war in which Christians should be actively involved.

6. Implications of theological positions advocating opposition to embryo research

Few theological commentators advocating absolute protection of embryos grapple to any extent with the implications of their stance for the reproductive technologies, patients confronted with infertility or genetic issues, or research scientists and fertility specialists. The implications fall into a number of categories.

6.1. Implications for theology's relationship with science

The main message to emerge is that theology overrules science in the prenatal area, since the only data and interpretations of relevance are theological ones. Consequently, there is no room for any scientific contribution to a Christian understanding of early embryonic development. Theology has all the answers since these are clearly discerned in Scripture. Theology trumps science, leaving no place for scientists who are Christians. From this it follows that biomedical scientists should not investigate the human embryo. From this one has to conclude that all embryological knowledge should be obtained from research on non-human mammalian embryos. Issues raised by depending upon experimental animal models are not discussed (Table 1).

A prohibitionist theological position is not only anti-abortion, but also anti-IVF since the destruction of embryos is implicit in the procedure [10]. The production of spare embryos in IVF is categorically rejected, as is PGD with its selection of embryos; and no genetic analysis is to take place that might lead to selecting one embryo over another. Following on from this, there can be no genetic manipulation of embryos and no gene editing, no matter what their goal. Any research using human embryos is viewed as intolerable, and is compared "to some kind of human sacrifice of children to the benefit of biomedical research" (MacKellar [23], p. 200). The proscription of embryo manipulation applies to non-viable embryos as much as to viable embryos, since all have the same value in God's sight with no difference in personhood between the two groups. This applies even though non-viable embryos are, by definition, incapable of developing beyond a few days (Table 1).

Conclusions along these lines are isolationist in that they ignore the prenatal environment, suggesting that there are no theological perspectives available on the environment. This comes as no surprise, since little would have been known about it by the biblical writers or church fathers. The understanding of the embryo available to us today are modern ones, based upon embryological work spanning many decades. In the absence of any interdisciplinary dialog, and by placing embryos outside the reach of other human beings and of the community within which they reside, they have become untouchable in a way in which postnatal persons are not untouchable. They are one of us in the human community, but are isolated from us in that they cannot contribute to any others within this community. By stressing their extreme vulnerability and need for total protection, they have been placed beyond the reach of those who could contribute to their future welfare.

6.2. Implications for theology's relationship with the church community

These stances pose challenges for Christian practitioners dealing with infertility issues in their patients. It is clear they are not to recommend IVF or any of its offshoots, but to what degree can they recommend drug treatments such as clomiphene or metformin? While these drugs influence ovulation and hence are not directly affecting embryos, they may have long-term effects on embryos. A precautionary approach may hesitate to use them, in the same way that the precautionary approach is being used to enhance the moral status of the embryo [54]. They are a challenge for the church when confronted with IVF children. One imagines these children will be accepted and loved for the human persons they are, and yet they also represent a

flawed origin. Should they exist since they have benefitted from the destruction (killing?) of many embryos, who are loved of God and should have been allowed to flourish (or disintegrate naturally).

The challenge for Christian reproductive biologists and embryologists is manifest. They have no contribution to make to the embryo debate, since only theology has a contribution to make. A logical outcome of this is that this is an area of science that should be closed to Christians (and possibly those of some other religious persuasions). There should be a 'no entry' sign, if they are to be faithful to the biblical revelation, as interpreted by these theologians.

The challenge for theological bioethicists is that, according to these theological viewpoints, every single embryo that is spontaneously aborted (lost) is loved by God and is destined to show forth his glory. Every embryo that is spontaneously aborted has a value equal to that of every embryo that successfully implants. Every embryo with abnormal chromosomes and will not develop normally (and will probably be spontaneously aborted) is as much loved by God as is every embryo that develops to term. Every embryo and every fetus that fails to develop past 12 weeks due to cervical incompetence is as much loved by God as every embryo that develops to full term. The onus on bioethicists to cope with these anomalies theologically, and to work through their implications for clinical practice is immense, and little discussed by theologians who do not find themselves in clinical situations.

6.3. Implications for theology's relationship with the public square

There tends to be a gap of immense proportions between the debate carried out within academia and that encountered in the public domain. This is particularly the case when it comes to the embryo and much of the debate around the reproductive technologies, especially ESCs. The literature on this is considerable, arising whenever there is political debate on changes in legislation to allow new research techniques involving embryos. A case study was provided by the US situation in the year 2001 when then president George W Bush became embroiled in the debate and introduced a ban on federal funding for research on newly created ESC lines [62, 63]. The policy was an uneasy compromise, that confined the use of ESCs to those currently in existence: extracted prior to 9 August 2001, but no new cells were to be extracted. The goal was to protect embryos, by preventing any additional ones from being destroyed (in the extraction of stem cells from them), but it was also intended to support in a limited way ongoing ESC research. In practice, it turned out to be a very unsatisfactory position both ethically and scientifically. The relevant point for the present discussion is that it was religiously motivated, but ultimately failed to satisfy either side. It was essentially a political construct with a tenuous ethical basis [62].

In delving into one example of public debate, I shall refer to the situation in New Zealand and attempts that have been made to allow research to be conducted on embryos. The details of the legislation are not of concern here, except to state that the reproductive technologies are governed by the Human Assisted Reproductive Technology (HART) Act 2004. Embryo research is not prohibited by the Act, but before it can take place it has to be approved by the Minister of Health on the recommendation of the Advisory Committee on Assisted

Reproductive Technology (ACART). ACART has to consult with the public prior to making a recommendation, to ensure the latter reflects the breadth of public opinion including the different ethical, spiritual, and cultural perspectives in society [64].

The range of responses received by ACART in 2007 provides a helpful indicator on public perceptions of the embryo, since much of the public opposition to embryo destruction has a religious base, even if it has not always been made explicit. Of the 58 organizations that put in submissions in 2007, 32 were explicitly religious. While all these were not opposed to this research, in all probability a majority was [65, 66].

Repeatedly, embryo research involving embryo destruction was condemned on grounds that it was 'playing God.' Religiously based responses frequently employed this language, without explaining why 'playing God' is to be decried. Unfortunately, there was little way of knowing to what extent the religious input was representative of any one religious community. One pro-life organization objected on the basis that human life begins at conception, claiming that this point signifies the time when the embryo is endowed by its creator with human rights [67]. Since every embryo is regarded as a miracle of God's loving creation, its destruction is akin to murder, the killing of 'innocent and defenseless unborn children,' even when these embryos are surplus to the requirements of IVF programs. There is no indication in these positions how the moral significance of 'conception' (fertilization) has been arrived at, even though it dominates much of the religiously inspired submissions in the public sphere.

Responses of this kind are not universal, and there are more nuanced protectionist positions within religious contributions. With the possibility of contributing to fundamental research on fertility and infertility, and the prevention and treatment of disease, another organization recognized that these accord with the Christian belief in a healing, redeeming God. As a result, they considered that humans are called upon to participate in God's work in relieving suffering, bringing healing and establishing justice. This led to the adoption of a moderate position, with its conclusion that "the ethical justification of research projects using human embryonic stem cells will depend on the potential benefits of the research and the quality of the scientific questions being asked" [67]. In light of this, a number of organizations saw a place for supporting those in need of healing, as long as the benefits outweighed the harms, and if the use of stem cells or other approaches can be justified clinically (**Table 1**).

By far the most detailed account of a religious position on embryo research was that of the Nathaniel Center, the New Zealand [Roman] Catholic Bioethics Center [68]. Its fundamental premise was the inviolate dignity of the human embryo, leading to the inevitable conclusion that no form of embryo destruction could be considered morally licit. There is to be no deviation from the stance that the human embryo has an absolute right to life from the moment of fertilization. The impression is given that the use of surplus embryos for research is ethically and theologically more problematic than allowing them to thaw.

This case study illustrates how public debate on ways of dealing with human embryos tends to be swayed by religious voices that oppose any interference with embryos. They do not of necessity reflect schools of theological thought that attempt to attain equipoise between the respective values of human embryos and those likely to benefit in future from this research. By

casting the spotlight exclusively onto embryos and their status, these viewpoints ignore the clinical and scientific possibilities and hence it is this one-dimensional message that dominates the religious contribution to public debate.

7. Seeking common ground

The dominance of what amounts to an anti-science, or irrelevance-of-science, standpoint poses problems for the influence that religious voices can have on public debate, other than to serve as voices that repeatedly oppose latest developments. This perpetual negativity does religious perspectives a disservice, that fails society as much as it does the religious communities themselves. Some theologians, however, reject a 'common morality' approach, limiting the potential for theologians to contribute to discussion of contemporary bioethical problems [69]. As an antidote, the following are worth considering.

First, all are to seek common ground and common values, rather than adopt impregnable and inflexible positions on novel procedures in a state of ethical and clinical flux. A problem with certain religious positions is that they assume they have infallible insights into questions such as the moral status of the *in vitro* embryo, insights that have to be accepted by everyone else including those who do not accept the validity of their theologically-derived premises [70]. By the same token, some secular thinkers claim the opposite, that the *in vitro* embryo has no moral standing [71]. Both positions reject the notion that any common ground exists, and that productive dialog is possible. Decision-making bodies have to be helped to find a way through this apparent impasse.

Second, all sides have to determine what are their core values, and the degree of overlap between these, regardless of their source. This requires finding models for relating to others in a pluralist culture. There also has to be honesty in sketching which medical advances are realistically possible using embryo research, the genetic editing of embryos, and germ line gene therapy.

The genius of the 1984 Warnock Report in the UK was that it achieved this, in spite of vehement criticism and denunciation by many protagonists at the time and subsequently [25, 47, 51]. Its limitation of embryo research to 14 days has also stood the test of time, even though there are voices raised against it now [72]. There was nothing definitive about this delineation, but it seemed to identify enough commonalities, both moral and scientific, to convince policy makers of its virtues. No matter how flawed it may have been it has worked remarkably well for over 30 years.

Third, no one within society has watertight answers to fiendishly new developments, and everyone should be grateful for the various perspectives brought to the debate, even when these stem from premises foreign to one's own. Religious perspectives tend to bring to the debate a cautionary perspective that may have implications for the source of embryos to be used in research, and the extent of manipulations on embryos [66]. This will satisfy neither end of the pro- and anti-research spectrum, but it provides fertile ground for dialog and constructive assessment within the boundary of moderately liberal legislation.

Those with religious voices need to reflect together on the core thrusts of their varying positions and how these can best serve society at large. Openness to dialog is central if religious perspectives are to be integrated into the diverse concerns and interests of those in a pluralist society. But this will only occur when those with religious perspectives regard themselves as integral to society and capable of making a contribution that will stand alongside, and complement, a range of other perspectives. Ongoing negativity will ensure their isolation within the debating chambers of society.

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